

Claims

- [c1] WHAT IS CLAIMED IS:
1. A method for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such method comprising:
- measuring an upstream time history of a signal produced by an exhaust gas oxygen sensor upstream of the converter and a time history of an exhaust gas oxygen sensor disposed downstream of the converter, such time histories varying between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level;
- determining a time delay between the upstream time history and the downstream time history during transitions in such time histories from the lean air-fuel ratio signal level to the rich air-fuel ratio signal level;
- comparing the determined time delay with a reference time delay to determine the efficiency of the converter;
- determining the effectiveness of the converter from such comparison
- [c2] 2. The method recited in claim 1 wherein the predetermined value is between two operating stoichiometric ratios.
- [c3] 3. The method recited in claim 2 wherein the converter includes an oxidizable material and a precious metal material.
- [c4] 4. A method for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such method comprising:
- generating a first signal indicative of an exhaust gas air fuel ratio relative to stoichiometry upstream of the converter;
- generating a second signal indicative of an exhaust gas air fuel ratio relative to stoichiometry downstream of the converter;

determining a first time when the first signal transitions from a lean to rich air fuel ratio relative stoichiometry;
determining a second time when the second signal transitions from a lean to rich air fuel ratio relative stoichiometry;
determining a catalyst operating efficiency based on the difference between the first and second times.

[c5] 5. The method recited in claim 4 wherein the converter includes an oxidizable material and a precious metal material.